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# METHODOLOGICAL ISSUES

# GUIDELINES UNDER ARTICLES 5, 7 AND 8 OF THE KYOTO PROTOCOL

## Report of a workshop on issues related to Articles 5, 7 and 8 of the Kyoto Protocol

## Addendum

## SECOND DRAFT OF THE GUIDELINES FOR NATIONAL SYSTEMS UNDER ARTICLE 5.1 OF THE KYOTO PROTOCOL

## Note by the secretariat

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Annex

Second draft of the guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5.1 of the Kyoto Protocol


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# I. INTRODUCTION

## A. Mandate

1. The Kyoto Protocol states in Article 5.1 that each Party included in Annex I shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. Guidelines for such national systems [...] shall be decided upon by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) at its first session.

2. The Conference of the Parties (COP), by its decision 8/CP.4, decided to prepare guidelines for national systems under Article 5.1 with a view to completion by COP 6 (FCCC/CP/1998/16/Add.1), with the purpose of recommending their adoption by the COP/MOP at its first session.

3. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its tenth session, requested the secretariat to organize a workshop on national systems and issues relating to adjustments, referred to in Article 5 of the Kyoto Protocol, before its twelfth session (FCCC/SBSTA/1999/6, para. 34 (d)). The SBSTA, at its eleventh session, requested the secretariat to prepare documentation for consideration at the above-mentioned workshop, including an initial draft of guidelines for national systems under Article 5.1 of the Kyoto Protocol (FCCC/SBSTA/1999/14, para. 51 (c)). The SBSTA also requested the secretariat to provide a report on the workshop and a second draft of the guidelines under Article 5.1, taking into consideration information from the workshop, for consideration by the SBSTA at its twelfth session.

4. Also at its eleventh session, the SBSTA took note of the information provided by Parties related to Article 5 of the Kyoto Protocol (FCCC/SBSTA/1999/MISC.9 and Add.1). It agreed to consider the basic elements of national systems listed in annex I to the report of the SBSTA on its eleventh session as a basis for further work (FCCC/SBSTA/1999/14, para. 51 (g)).

5. The SBSTA took note of the information provided by a representative of the Intergovernmental Panel on Climate Change (IPCC) on its ongoing work related to good practice in national inventory preparation, including managing uncertainty. It noted that the application of good practices in the use of the IPCC 1996 Revised Guidelines for National Greenhouse Gas inventories may improve the quality of such inventories and that some elements of good practices may also be considered for the preparation of guidelines under Articles 5, 7 and 8 of the Protocol. The SBSTA noted that a report on these issues will be provided by the IPCC for consideration at its twelfth session (FCCC/SBSTA/1999/14, para. 51 (h)).[1]

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[1] A draft of the IPCC document entitled: "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" was sent by the IPCC to countries for a joint expert-government review on 17 December 1999. It is expected that the sixteenth session of the IPCC, to be held from 1 to 8 May 2000, will complete a final version of the guidance.

## B. Scope of the note

6. As requested, the secretariat organized a workshop on issues related to Articles 5, 7 and 8 of the Kyoto Protocol, which was held in Bonn, from 14 to 16 March 2000. A preliminary version of the guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5.1 of the Kyoto Protocol, referred to below as guidelines for national systems, was made available at the workshop as working paper No.2. The report on this workshop is contained in document FCCC/SBSTA/2000/INF.5.

7. In response to the mandate of the SBSTA, this note contains draft guidelines for national systems (see annex). The guidelines are based on: (a) the basic elements of national systems agreed upon by Parties at SBSTA 11; (b) the draft of the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, referred to below as the IPCC good practice guidance;[2] (c) notes by the secretariat on the experience of Parties with existing national systems used by Parties to prepare national greenhouse gas (GHG) inventories;[3] and (d) views from Parties on national systems, adjustments and guidelines under Articles 5, 7 and 8 of the Kyoto Protocol, contained in documents FCCC/SBSTA/1999/MISC.9 and Add.1 and FCCC/SBSTA/2000/MISC.1. The guidelines have been modified by taking into consideration the conclusions of the workshop mentioned in paragraph 3 above. They have undergone editing and minor structural changes and have been reviewed for consistency by the secretariat under the guidance of the co-chairs of the working group[4] responsible for this topic at the workshop.

8. The secretariat hopes that this note will facilitate the consideration of the guidelines for national systems by the SBSTA at its twelfth session. It could serve as the starting point for considering the guidelines for national systems that are expected to be completed by the sixth session of the COP, as requested by decision 8/CP.4. It is anticipated that the guidelines for national systems will be revised after the twelfth session of the SBSTA, as needed, and made available to Parties for consideration by the SBSTA at its thirteenth session.

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[2] The definitions used in these draft guidelines for national systems which originate from the IPCC good practice guidance will be updated once the IPCC good practice guidance is completed. Also any substantive change resulting from the process of approval of the report by the IPCC will be properly reflected in further versions of the draft guidelines for national systems.

[3] See document FCCC/SBSTA/2000/INF.3 "Experience of Annex I Parties with existing national systems for preparing greenhouse gas inventories". See also the report of the secretariat FCCC/SBSTA/1999/INF.1: "Report on the workshop on the new UNFCCC reporting guidelines on annual inventories and options to address challenges facing Annex I Parties with economies in transition in preparing greenhouse gas inventories".

[4] Ms. Helen Plume, (New Zealand) and Mr. Newton Paciornik (Brazil).

## C. Possible action by the SBSTA

9. The SBSTA may wish to consider the information in this note and to endorse or modify the main elements of the guidelines for national systems. The SBSTA may also wish to consider how the relationship between issues pertaining to Article 5.1 and other provisions of the Kyoto Protocol should be reflected in the guidelines for national systems.

10. The SBSTA may wish to provide guidance related to preparations for its thirteenth session, if further modifications to the guidelines for national systems are warranted, and to a draft decision for consideration by the COP at its sixth session, as appropriate.

## D. Approach

11. The draft guidelines for national systems were prepared to clearly differentiate between the mandatory and desirable functions of national systems. This is intended to identify the obligations of Parties under Article 5.1 of the Kyoto Protocol, particularly for the first commitment period.

12. The draft guidelines for national systems were prepared in a function-oriented way to ensure the quality and reliability of the estimation of the GHG emissions by sources and removals by sinks to be performed by different national systems. The starting premises were:

(a) That national circumstances resulting from the existing differences in institutional structure and organization, as well as approaches to preparing national GHG inventories, should not negatively affect the performance of the functions by the national systems; and

(b) That these functions should, at least, ensure an adequate level of quality in the estimation of GHG emissions by sources and removals by sinks.

13. The draft guidelines for national systems are built in part on the guidelines adopted under the Convention, namely the guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories, and the guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention (FCCC/CP/1999/7). The secretariat assumes that these guidelines will be updated and revised by the COP after the trial periods specified in the corresponding COP decisions,[5] and that the COP/MOP will take into account this experience and may refine these guidelines for national systems accordingly.

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[5] By its decision 3/CP.5, the COP decided that possible revisions to the UNFCCC reporting guidelines on annual inventories should be considered by the SBSTA at its fifteenth session. The Subsidiary Body for Implementation (SBI), following the advice of the SBSTA, agreed to set up a two-year trial period beginning in early 2000, to assess the UNFCCC reporting guidelines on annual inventories, particularly the common reporting format, with a view to revising them at COP 7, taking into consideration, *inter alia*, experience gained by Parties and the secretariat, and the input of the IPCC (FCCC/1999/8, para. 26 (c)). By its decision 6/CP.5, it adopted for a trial period covering inventory submissions due in 2000 and 2001 the guidelines for the technical review of greenhouse gas inventories from Annex I Parties. The COP requested the SBI to evaluate the experience with the technical review, with a view to adopting revised guidelines for the technical review of inventories at the eighth session of the COP.

14. The secretariat is aware that the IPCC good practice guidance is still under consideration by the IPCC. The guidelines for national systems were prepared on the assumption that the report will be completed by the sixteenth IPCC plenary to be held from 1 to 8 May 2000. A change in this assumption would require a reconsideration of the approach elaborated below. Parties would need to reconsider the implications at the twelfth session of the SBSTA.

15. The secretariat recognizes that the IPCC good practice guidance could make an important contribution to improving the quality of GHG inventories. With this in mind, the secretariat included several elements of this guidance within the guidelines for national systems and identified some aspects as mandatory requirements. These elements, if accepted by the Parties, would promote higher quality inventories by Annex I Parties in relation to the current practices under the Convention.

16. The secretariat also recognizes that the achievement of higher quality inventories is an evolutionary process. Further improvements in these guidelines for national systems could be envisioned once Parties gain more experience following the good practice guidance and additional resources are available for the preparation of national GHG inventories. Therefore, some other elements of the IPCC good practice guidance were not included as mandatory in the draft guidelines for national systems. The secretariat hopes it has proposed an appropriate balance between mandatory and desirable elements in the draft guidelines.

17. It is also assumed that after consideration of the IPCC good practice guidance by the SBSTA, Annex I Parties will decide to use that guidance to the extent possible and test it when preparing their national GHG inventories to be submitted from the year 2001. This test would facilitate the refining of these guidelines for national systems, as well as of the UNFCCC reporting guidelines on annual inventories and the guidelines for technical review of inventories of Annex I Parties, by the COP and/or the COP/MOP, as appropriate.

18. The draft guidelines for national systems take into account the need for consistency and coherence with other provisions of the Kyoto Protocol, such as other guidelines, modalities and rules under Articles 3.3, 3.4, 5.2, 6, 7, 8, 12 and 17. Additional elements resulting from work on these articles may need to be reflected in the guidelines for national systems in the future. In particular, participants in the workshop mentioned in paragraph 7 above concluded that the relationship between national systems under Article 5.1 and national registries should be defined at a later stage. In this context, the following questions need to be considered:

(a) Will national registries be part of the national systems under Article 5.1?, and

(b) If not, what would be the relationship between national registries and national systems?

19. Participants also suggested that further consideration of the linkages between national systems and efforts to quantify the effectiveness of domestic actions to either reduce GHG emissions or increase GHG removals may be needed.

20. The second draft of the guidelines for national systems includes several footnotes that provide supplementary information. Most of them will not be included when the guidelines are completed. Footnotes describing elements of the good practice guidance, namely footnotes 7, 8, 12, 13, 14, 15, 16, 17, 18, and 20, will be replaced with references to the corresponding paragraphs of the IPCC report on good practice guidance, once it has been adopted.

21. Article 5.1 of the Kyoto Protocol stipulates that each Annex I Party shall have in place a national system, no later than one year prior to the start of the first commitment period. It may take several years to establish the proper institutional and procedural arrangements for such a system. Timely completion of the guidelines for national systems by COP 6 would enable Parties to begin to make such arrangements and could allow the testing of national systems in advance of the year 2007. This may include a review of national systems before the start of the first commitment period, if Parties so wish. This approach may also be necessary to improve and refine these guidelines. Furthermore, early completion of the guidelines would allow Parties to be better prepared to meet the requirements of the Kyoto Protocol, in particular with their obligations under Article 5.1.

Annex

# SECOND DRAFT OF THE GUIDELINES FOR NATIONAL SYSTEMS FOR THE ESTIMATION OF ANTHROPOGENIC GREENHOUSE GAS EMISSIONS BY SOURCES AND REMOVALS BY SINKS UNDER ARTICLE 5.1 OF THE KYOTO PROTOCOL[1]

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[1] All articles referred to in these guidelines are those of the Kyoto Protocol. For the sake of brevity, the Kyoto Protocol is not specified after each article.

## I. OBJECTIVES

1. The objectives of national systems under Article 5.1 for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, referred to below as national systems, are:

(a) To enable Parties included in Annex I to the Convention (Annex I Parties) to estimate greenhouse gas (GHG) emissions by sources and removals by sinks, as required by Article 5.1;

(b) To assist Annex I Parties in meeting their commitments under Articles 3 and 7;

(c) To facilitate the review of the information submitted under Article 7 by Annex I Parties, as required by Article 8;

(d) To assist Annex I Parties to ensure and improve the quality of their inventories[2] as requested by Article 10 (a).

## II. DEFINITION OF NATIONAL SYSTEM

2. A national system includes all institutional, legal and procedural arrangements within an Annex I Party for estimating GHG emissions by sources and removals by sinks, for reporting and archiving inventory information, and for facilitating its review as required by these guidelines for national systems[3], to meet the Party's obligations under the Kyoto Protocol.

## III. CHARACTERISTICS

3. National systems may differ among Annex I Parties depending on their national circumstances. National circumstances shall not negatively affect the performance of the functions described in these guidelines.

4. National systems should ensure the transparency, consistency, comparability, completeness and accuracy of inventories as defined in the guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories, adopted by the Conference of the Parties (COP) at its fifth session, referred to below as the reporting guidelines on annual inventories, or any subsequent revisions of these guidelines adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP), taking into account relevant decisions of the Conference of the Parties.

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[2] "National GHG inventories" is referred to simply as "inventories" in these guidelines for the sake of brevity.

[3] The guidelines for national systems for the estimation anthropogenic emissions by sources and removals by sinks under Article 5.1 of the Kyoto Protocol are referred to as "guidelines for national systems" in this document.

5. National systems should ensure confidence in the quality of the inventory by collecting activity data and selecting emission factors appropriately, and by implementing uncertainty assessment and quality assurance and control activities, including procedures for the verification of the inventory data at the national level, as described in these guidelines for national systems.

6. National systems should be robust enough to support compliance with the Kyoto Protocol commitments related to the estimation of GHG emissions and removals by ensuring that the mandatory functions set out in these guidelines for national systems are performed and that every effort is made to perform the desirable functions.

## IV. OTHER DEFINITIONS

7. In the context of the guidelines for national systems the following definitions are accepted:

(a) Good practices, as defined in the Intergovernmental Panel on Climate Change (IPCC) good practice guidance,[4] are a set of procedures that aim to produce inventories which are accurate in the sense of being neither over- nor underestimated as far as can be judged, and in which uncertainties are reduced as far as practicable. Good practices aim also to produce inventories that are transparent, documented, consistent over time, complete, comparable, assessed for uncertainties, subject to quality assurance and control and efficient in the use of resources. The good practice guidance covers choice of estimation methods appropriate to national circumstances, quality assurance and quality control at the national level, quantification of uncertainties, and data archiving and reporting to promote transparency. Good practice guidance provides a reference that complements and is consistent with the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories;[5]

(b) Quality assurance and quality control (QA/QC) encompass activities aimed at improving the quality of the inventories. These activities may be common to all the inventory source-categories or may be specific to some of them. Quality control and quality assurance activities have different characteristics as defined below:

(i) Quality control (QC) is a system of routine technical activities implemented by inventory development personnel to measure and control the quality of the inventory as it is being developed. It is designed to provide routine and consistent checks to ensure data integrity, correctness and completeness, to identify and address errors and omissions, and to document and archive inventory material and record all activities. QC

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[4] The IPCC "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" is referred to as the "IPCC good practice guidance" in these guidelines. The report is intended to be available for consideration by the SBSTA at its twelfth session.

[5] The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories are referred to as the IPCC Guidelines in these guidelines for national systems.

activities include accuracy checks on data acquisition and calculations and the use of approved standardized procedures for emission calculations, measurements, uncertainty estimations and reporting. Higher tier QC activities also include technical reviews of sources, activity data and emission factors, and methods;

(ii) Quality assurance (QA) activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation development process. These QA review procedures should be performed upon a finalized inventory, preferably by independent third parties, following the implementation of the QC procedures. These QA review procedures shall verify that data quality objectives were met and shall aim to ensure that the inventory represents the best possible estimate of emissions and sinks given the current state of scientific knowledge and data available, and assess the effectiveness of the QC programme;

(c) Source category refers to the emissions by sources and removals by sinks of GHGs as used in the IPCC Guidelines in describing methods to estimate a national GHG inventory. In each IPCC source category emissions and removals of different GHGs may exist;

(d) Key source category is one that is prioritized within the inventory because its estimate has a significant influence on a country's total inventory of direct GHGs in terms of the absolute level of emissions, the trend in emissions, or both. The identification of key source-categories allows the resources available for inventory preparation to be prioritized and the best possible estimates prepared for the most significant sources;[6]

(e) Decision tree is a procedure set out in the IPCC good practice guidance for choosing the method of estimating the emissions and removals of a given source category in each sector of the IPCC Guidelines, which is illustrated in the figure 1 shown in the appendix to these guidelines. The decision trees formalize the choice of estimation method most suited to national circumstances. The sectoral advice linked to the decision trees also provides information on the choice of emission factors and activity data;

(f) Recalculation is a procedure for re-estimating GHG emissions and removals of previously submitted inventories as a consequence of changes in methodologies, changes in the manner in which emission factors and activity data are obtained and used, or the inclusion of new source categories. Generally, recalculations are a consequence of improved inventory capacity and data availability and are desirable when they result in more accurate and complete estimates.

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[6] Generally, inventory uncertainty is lower when emissions are estimated using the most rigorous methods, but as resources are finite, this may not be feasible for every source category. In accordance with the good practice guidance, key source categories are those for which the most rigorous methods should apply, whereas this is not required for non-key source categories. Key source categories are identified by performing a quantitative analysis in which the uncertainty of the emission and/or removal estimates of each source category is taken into account. Key source categories may also be identified using relevant qualitative criteria. Specific methodological guidance is provided in the IPCC good practice guidance.

The recalculation of historic emissions and removals should be performed when methods have been changed or refined[7], when new source categories or gases are included in the national inventory, or when errors in the estimates are identified and corrected. The entire time-series of emissions and removals, including the base year, should be calculated using the changed or refined methods in order to consistently assess emission trends.

## V. GENERAL FUNCTIONS

8. Each Annex I Party shall undertake through its national system, taking into account its national circumstances, the following general functions:

(a) The implementation of institutional, legal and procedural arrangements, as appropriate, between the government agencies and other entities responsible for the performance of all functions defined in these guidelines;

(b) The preparation and reporting of national annual inventories in a timely manner according to the relevant COP/MOP decisions, including the collection of inventory activity data and selection of emission factors, in accordance with the methodologies of the IPCC Guidelines, as elaborated by any good practices agreed upon by the COP/MOP; and in accordance with the reporting guidelines on annual inventories, or any subsequent revisions of these guidelines adopted by the COP/MOP, taking into account relevant decisions of the Conference of the Parties;[8]

(c) The reporting in a timely manner of the supplementary information to be incorporated in the annual inventory[9] for the purposes of ensuring compliance with Article 3, to be determined by the COP/MOP in accordance with Article 7;

(d) The formulation and implementation, where relevant and to the extent possible, of cost-effective national programmes, as well as cooperation in regional programmes where appropriate, to improve the quality of national emission factors, activity data and methodologies, including measuring and monitoring, for the preparation and periodic updating of national inventories using methodologies agreed upon by the COP and consistent with the IPCC

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[7] A methodological change occurs when a country uses a different tier for estimating emissions from a source category or when it moves from a tier described in the 1996 Revised IPCC Guidelines to a national method. A methodological refinement occurs when a country uses the same tier for estimating emissions but applies it using a different data source or a different level of aggregation, or if data of higher quality could be introduced due to improved data collection methods.

[8] By its decision 3/CP.5, the COP decided that possible revisions to the UNFCCC reporting guidelines on annual inventories should be considered by the SBSTA at its fifteenth session. The Subsidiary Body for Implementation (SBI), following the advice of the SBSTA, agreed to set up a two-year trial period beginning in early 2000, to assess the UNFCCC reporting guidelines on annual inventories, particularly the common reporting format, with a view to revising them at COP 7, taking into consideration, *inter alia*, experience gained by Parties and the secretariat, and the input of the IPCC.

[9] The information referred to here includes only supplementary information related to GHG emissions and removals. The definitive scope of the supplementary information under Article 7.1, which may include inventory and non-inventory related information, will be defined in the guidelines under Article 7 to be adopted by COP/MOP.

Guidelines, as elaborated by any good practices agreed upon by the COP, and in line with the provisions of Article 10 (a);

(e) The provision of timely and competent responses to the questions raised during the review process under Article 8; and

(f) The implementation of arrangements for ensuring and updating the technical competence of the staff involved in the inventory development process.

## VI. SPECIFIC FUNCTIONS

9. In order to perform the above-mentioned general functions in accordance with the characteristics of national systems set out in these guidelines, each Annex I Party shall undertake specific functions in its inventory development process,[10] namely during inventory planning, preparation, reporting and management.

10. The inventory planning functions to be undertaken by Parties shall include:

(a) The designation of a single national entity responsible for the national inventory and its whole development process, and the allocation of responsibilities in the inventory development process, including those related to quality control (QC) and quality assurance (QA).

(b) The elaboration of a documented plan for the planning, preparation, reporting and management of the inventory. This plan shall include:

(i) Specific QC procedures to be implemented along with the inventory development process, and QA procedures, where appropriate;

(ii) Activities aimed to ensure sufficient capacity for performing the functions defined in these guidelines, such as data collection for estimating GHG emissions and removals;

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[10] For the purpose of these guidelines, the inventory development process encompasses the indicative steps of inventory planning, preparation, reporting and management. These steps of the inventory development process are considered in these guidelines only in order to clearly identify the functions to be performed by the national systems, as described in paragraphs 10 to 12 below.

(iii) Activities to address the issues identified for improvement of the inventory development process and of the inventory quality improvement programme, and in external reviews conducted under Article 8 or commissioned by the national entity responsible for the inventory;

(c) The establishment of the institutional, legal and procedural arrangements for collecting, processing, communicating and archiving inventory data necessary for the preparation, reporting and management of the inventory as described in paragraphs 8, 10, 11, 12, 13 and 14 of these guidelines. These arrangements shall provide for the necessary authority for the timely collection of data;

(i) The arrangements referred to in sub-paragraph (c) above related to activity data shall aim to ensure close cooperation between the national entity responsible for the national inventory and the entity responsible for collection of activity data, in particular national statistical services and other organizations, such as enterprises, that may collect and/or maintain activity data;

(ii) The arrangements referred to in sub-paragraph (c) above related to emission factors shall aim to ensure close cooperation between the national entity responsible for the national inventory and other entities responsible for developing, compiling and recommending emission factors to be used in the inventories. These arrangements may include cooperation with relevant regional and/or international entities;

(iii) The arrangements referred to in subparagraph (c) above shall include the development and implementation of QC and QA activities, where appropriate;

(d) The implementation of processes for the official consideration and approval of the inventory prior to its submission and for consideration and approval of the use of new and/or revised emission factors and relevant decisions for recalculating estimates that were submitted in previous inventories;

(e) The establishment of internal quality objectives, in line with the national programmes referred to in paragraph 8(d) above, for activity data, emission factors and methodologies and the implementation of the necessary activities to meet this internal quality objective within a fixed deadline. Inputs from the review process under Article 8, other review commissioned under national systems and results of the QA/QC activities should be taken into account for the establishment of such quality objectives.

11. The inventory preparation and reporting functions to be undertaken by Parties:

(a) Shall include:

(i) The identification of the base year, taking into account the provisions of Article 3.5 for those Annex I Parties undergoing the process of transition to a market economy and the provision of Article 3.8 for estimates of hydrofluorocarbon (HFC), perfluorocarbon (PFC) and sulphur hexafluoride ($SF_6$) emissions. This base year is to be used for the purpose of calculating the assigned amounts under Article 3.7, and to be used in these guidelines for national systems, where appropriate;

(ii) The identification of key source categories by performing a quantitative analysis, at least the tier 1 approach for identifying key source categories[11] of the IPCC good practice guidance. Parties are encouraged to identify the key sources using the tier 2 approach provided that relevant data is available. The identification of key source categories should include the consideration of other qualitative criteria,[12] such as high expected emission growth, high uncertainty or unexpectedly low or high emissions, as described in the IPCC good practice guidance. The list of source categories to be used for the identification of key source categories is included in table 1[13] in the appendix to these guidelines. Each GHG emitted from a single source category is to be considered separately, unless there are specific methodological reasons for treating these GHGs collectively;

(iii) The use of the good practice guidance in all source categories in accordance with the corresponding decision trees and with the national availability of data. This includes the pursuit of the good practice guidance related to the choice of emission factors, activity data and uncertainty assessment for the relevant method (tier)[14] in each source category. Parties should make every effort to use the most rigorous method(s) (tier(s)) included in the decision trees of the good practice

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[11] The tier 1 approach is the simplest for the identification of key sources. The tier 2 method is a more detailed analysis which builds on the tier 1 approach and incorporates uncertainty estimates at the level of source categories in the calculations.

[12] In most cases, the application of these qualitative criteria will identify source categories already defined as key through the quantitative analysis. Some additional key sources may be identified, however, and these may be added to the list of key sources.

[13] This list is based on the source categories of the IPCC good practice guidance.

[14] In almost all source categories of the IPCC Guidelines, two or more tiers exist for estimating GHG emissions and removals. Generally, when data are available, the less uncertain estimates result from a higher IPCC tier.

guidance in the source categories that are identified as key, unless such methods would not be the most appropriate for a given source category;

(iv) The preparation and reporting of the inventory following the good practice guidance for estimating inventory uncertainty and recalculating previously submitted estimates of emissions and removals and the specific guidance provided in paragraphs 10, 11, 12, 20 and 24 of the reporting guidelines on annual inventories. In keeping with the aim of the good practice guidance, total inventory uncertainty is to be reported in quantitative terms to help in identifying areas for further improvement and to track the accuracy of the inventory;

(v) The compilation of the national inventory in accordance with the reporting guidelines on annual inventories, including the common reporting format, and taking into account the provisions of paragraph 11 (a) (ii) and (iii) above, as well as the supplementary information referred to in paragraph 8 (c) above;

(vi) The application of the general-inventory-level QC procedures (tier 1 QC)[15] as included in table 2 in the appendix to these guidelines, bearing in mind that it will not be possible to check all aspects of inventory input data, parameters and calculations every year. Checks of data and calculations related to identified key sources are to be conducted annually. Parties are encouraged to apply these checks and calculations to the non-key source categories, to the extent possible;

(vii) An annual or periodical internal evaluation of:

- The inventory development process;
- The inventory quality improvement programme; and
- The actions taken by the Party in response to the problems identified in the reports of the external reviews conducted under Article 8 or commissioned by the national entity responsible for the inventory;

(viii) The preparation of texts that should be included in the national inventory report, as requested in paragraph 33 of the reporting guidelines on annual inventories, and information on:

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[15] Tier 1 is the simpler QC procedure described in the IPCC good practice guidance. It focuses on the processing, handling, documenting, archiving and reporting procedures that are common to all the inventory sources.

- Actions taken under the programmes for improving the quality of inventories referred to in paragraph 8 (d) above; and
- Key source categories for which the most rigorous method(s) (tier(s)) referred to in paragraph 11 (a) (iii) above were not used, including actions taken or planned to improve the estimate of these key source categories;

(b) Should include:

(i) The application of source category-specific QC procedures (tier 2 QC)[16] for the individual source categories that are identified as key;

(ii) The application of source category-specific QC procedures (Tier 2 QC) for those individual source categories in which significant methodological and data revisions have taken place;

(iii) The conduct of a basic expert review of the inventory[17] by personnel that have not been involved in the inventory development, preferably an independent third party, before the submission of the inventory in accordance with the planned QA procedures referred to in paragraph 10 (b) above. Key source categories should be given priority as well as source categories where significant changes in methods or data have been made. All expert reviews should be well documented, preferably in a report or checklist format that shows the findings and recommendations for improvement.

12. The inventory management functions to be undertaken by Parties:

(a) Shall include:

(i) The archiving of the inventory information of each year, including the base year, in accordance with paragraph 35 of the reporting guidelines on annual inventories, or any subsequent revisions to these guidelines adopted by the COP/MOP, taking into account relevant decisions of the Conference of the Parties. This information should facilitate the review activities by the expert review team under Article 8 by enabling estimates of emissions and removals to be traced back to the original disaggregated emission factors and activity data;

(ii) The access to the archived inventory information by the expert review teams under Article 8, except for that part of the information which contains confidential data. This part of confidential information would be

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[16] In contrast to general QC techniques, tier 2 QC source category specific procedures are directed at emission and activity data and uncertainties used in the estimation methods of individual source categories.

[17] The focus of these QC procedures is to identify potential problems and make corrections where possible.

accessible under the provisions of confidentiality for managing inventory information to be developed by each Annex I Party in accordance with the appropriate guidelines to be adopted by the COP/MOP;[18]

(iii) The archiving of internal documentation of QA/QC activities and the reports of external reviews under Article 8 and those commissioned under the national systems, including corrections and modifications to the inventory resulting from these activities;

(iv) The response to requests for clarifying inventory information resulting from the different stages of the review process of the inventory information and information on the national system in a timely manner, as described in the revised guidelines for the technical review of the inventories of Annex I Parties to be adopted by the COP at its eighth session or any subsequent revision adopted by the COP/MOP and in the guidelines for the review of implementation by expert review teams, as appropriate;

(v) The archiving of the list of used annual key-source categories and the documentation of the key source category identification approaches; and

(vi) The archiving of improvement programmes and inventory plans as described in paragraphs 8 (d) and 10 (b) above, as well as reports described in paragraph 13 below.

(b) Should include:

The conduct of more extensive expert peer review and/or audits as additional QA procedures[19] within the available resources as described in the good practice guidance.

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[18] The provisions of confidentiality may be developed in future versions of the revised guidelines for the technical review of the inventories of Annex I Parties adopted by the COP at its eighth session or by the COP/MOP.

[19] Expert peer review consists of a review of calculation or assumptions by experts in relevant fields. This procedure is accomplished by reviewing the documentation associated with the methods and results. There are no standard tools for expert peer review, and its use should be considered on a case-by-case basis. Audits are used to evaluate how effectively the inventory development team complies with the minimum specifications outlined in the QC plan.

## VII. REPORTING AND INFORMATION SHARING [20]

13. Each Annex I Party shall include in its national communication:

(a) A description of how it has undertaken the functions defined in paragraphs 8, 10, 11 (a) and 12 (a) above during the period between successive national communications. This includes an explanation of what functions were not performed or only partially performed and information on actions planned or taken to perform them in the future;

(b) A description of the inventory development plan as defined in paragraph 10 (b) (ii) above; and

(c) A description of the institutional arrangements as defined in paragraphs 8 (a) and 10 (a), (c), and (d) above, including the key legal and procedural arrangements.

14. Each Annex I Party:

(a) Shall make available its national GHG inventory report, including the common reporting format, according to the reporting guidelines on annual inventories or any subsequent revisions of these guidelines adopted by the COP/MOP for its base year and years constituting the commitment period. The information shall be made available on a national website;

(b) Shall make available the postal and electronic addresses of the national entity responsible for the inventory; and

(c) Should make available to any interested Party, organization or person, the information described in paragraph 13 above in either printed or electronic format, upon request.

## VIII. ADOPTION AND UPDATING OF THE GUIDELINES

15. These guidelines for national systems shall be adopted, reviewed and revised, as appropriate, according to the decisions of the COP/MOP, taking into account any relevant decision of the COP.

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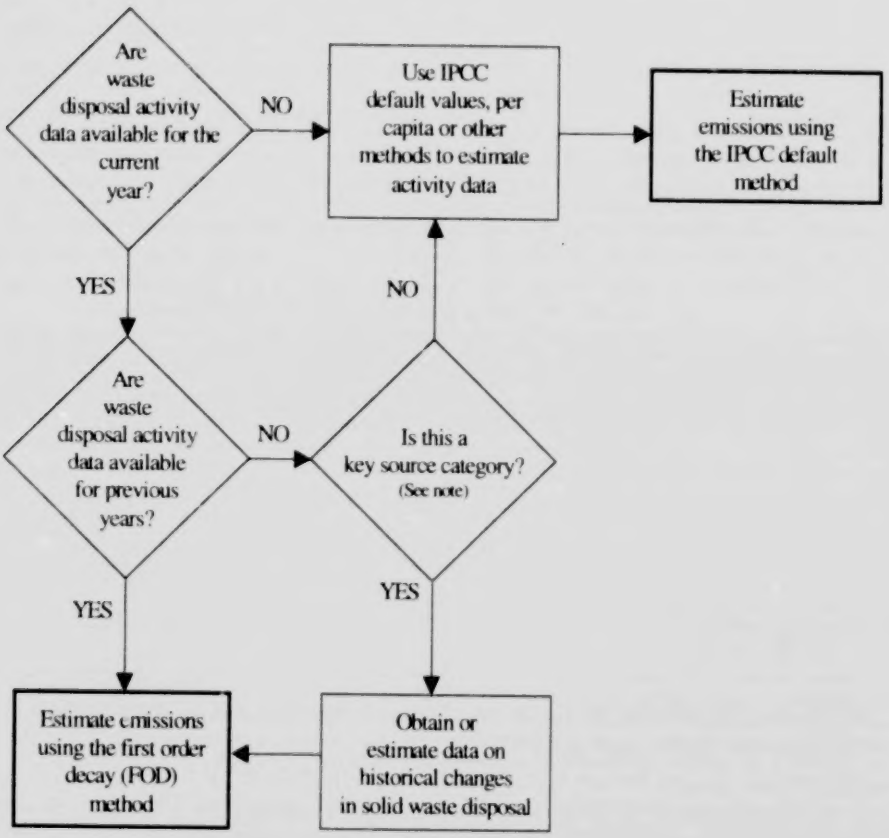
[20] This section of the guidelines will be incorporated and possibly further be expanded in the guidelines for reporting supplementary information under Article 7. Parties may wish to consider if this section should remain in these guidelines for national systems.

Appendix

## FIGURE AND TABLES

**Figure 1. Sample decision tree for choice of method for estimating methane emissions from solid waste disposal sites**


Are waste disposal activity data available for the current year?
NO
Use IPCC default values, per capita or other methods to estimate activity data
Estimate emissions using the IPCC default method
YES
NO
Are waste disposal activity data available for previous years?
NO
Is this a key source category? (See note)
YES
YES
Estimate emissions using the first order decay (FOD) method
Obtain or estimate data on historical changes in solid waste disposal

**NOTE:** A **key source category** is one that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both.

**Table 1. List of source categories to be assessed**

| Source categories to be assessed in key source analysis | Special considerations |
|---|---|
| **Emissions from energy use** | |
| $CO_2$ emissions from stationary combustion | Disaggregate to the level where emission factors are distinguished. In most inventories, this will be the main fuel types. If emission factors are determined independently for some sub-categories, these should be distinguished in the analysis. |
| Non-$CO_2$ emissions from stationary combustion | Assess emissions of $_4$ and $N_2O$ separately. |
| Mobile combustion: road vehicles | Assess emissions of $CO_2$, $CH_4$ and $N_2O$ separately. |
| Mobile combustion: waterborne navigation | Assess emissions of $CO_2$, $CH_4$ and $N_2O$ separately. |
| Mobile combustion: aircraft | Assess emissions of $CO_2$, $CH_4$ and $N_2O$ separately. |
| Fugitive emissions from coal mining and handling | If this source is key, it is likely that underground mining will be the most significant subcategory. |
| Fugitive emissions from natural gas and oil | This source category comprises several subcategories which may be significant. Countries should assess this source category, if it is key, to determine which subcategories are most important. |
| **Agricultural sources** | |
| $CH_4$ emissions from livestock enteric fermentation | If this source is key, it is likely that cattle, buffalo and/or sheep will be the most significant subcategories. |
| $CH_4$ emissions from manure management | If this source is key, it is likely that cattle and/or swine will be the most significant subcategories. |
| $N_2O$ emissions from animal waste management systems | |
| $CH_4$ and $N_2O$ emissions from savanna burning | Assess emissions of $CH_4$ and $N_2O$ separately. |
| $CH_4$ and $N_2O$ emissions from agricultural residue Burning | Assess emissions of $CH_4$ and $N_2O$ separately. |
| Direct $N_2O$ emissions from agricultural soils | |
| Indirect $N_2O$ emissions from nitrogen used in agriculture | |
| $CH_4$ emissions from rice production | |
| **Industrial processes and the new gases** | |
| $CO_2$ emissions from cement production | |
| $CO_2$ emissions from lime production | |
| $CO_2$ emissions from the iron and steel industry | |
| $N_2O$ emissions from adipic and nitric acid production | Assess adipic and nitric acids separately. |
| PFCs emissions from aluminium production | |

**Table 1 (continued)**

| Source categories to be assessed in key source analyses | Special considerations |
|---|---|
| $SF_6$ in magnesium production' | |
| $SF_6$ emissions from electrical equipment | |
| $SF_6$ emissions from other uses | |
| $SF_6$ emissions from production of SF6 | |
| PFC, HFC, $SF_6$ emissions from semiconductor manufacture | Assess emissions of all compounds jointly on a global warming potential (GWP)-weighted basis, since they are all used in similar fashions in the process. |
| Substitutes for ozone depleting substances (ODS) | Assess emissions of all HFCs and PFCs used as substitutes for ODS jointly on a GWP-weighted basis, given the importance of having a consistent method for all ODS sources. |
| Estimation of HFC-23 from HCFC-22 manufacture | |
| **Emissions from waste** | |
| $CH_4$ emissions from solid waste disposal sites | |
| $CH_4$ emissions from wastewater handling | |
| $N_2O$ emissions from human sewage | |
| Emissions from waste incineration | Assess emissions of $CO_2$ and $N_2O$ separately. |
| Other | Other sources of direct greenhouse gas emissions not listed above should also be included. |

Note: The land-use change and forestry source category is not included in the table. In principle, the the methods for identification of key source categories described in the IPCC good practice guidance could be applied to that category, but further work on the topic is necessary.

**Table 2. Tier 1 general inventory level QC procedures**

| QC ACTIVITY | PROCEDURES |
|---|---|
| Select the source categories from each sector as the samples for QC checks and document the categories and the selection criteria. | · Identify the key source categories and ensure that these are included in the QC process. Select a number of additional source categories, representing all sectors.<br>· Establish criteria and processes under which all source categories will be checked during a given period of time (e.g. every three years). |
| Check for data input errors during the transcription from the original references and document the categories checked and the findings. | · Confirm that bibliographical data references are properly cited.<br>· Check that assumptions and criteria for selection of activity data and emission factors are documented.<br>· Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors. |
| Check that emissions are calculated correctly and document the categories checked and the findings. | · Manually duplicate a representative sample of emission calculations.<br>· Selectively mimic complex model calculations with abbreviated manual calculations to judge relative accuracy. |
| Check that parameter and emission units are correctly recorded and that appropriate conversion factors are used and document the categories checked and the findings. | · Check that units are properly labelled in calculation sheets.<br>· Check that units are correctly carried through from beginning to end of calculations.<br>· Check that conversion factors are correct.<br>· Check that temporal and spatial adjustment factors are used correctly. |
| Check the integrity of database files and document the categories checked and the findings. | · Confirm that the data path is correctly represented in the database and that all necessary processing steps have been followed.<br>· Confirm that data relationships are correctly represented in the database.<br>· Ensure that data fields are properly labelled and have correct design specifications. |
| Check for consistency in data between source categories and document the categories checked and the findings. | · Identify parameters (e.g., activity levels, constants) that should be common to multiple source categories and confirm that there is consistency in the values used for these parameters in the emission calculations. |
| Check that the movement of inventory data among processing steps is correct and document the categories checked and the findings. | · Check that emission data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries.<br>· Check that emission data are correctly transcribed between different intermediate products. |

**Table 2 (continued)**

| QC ACTIVITY | PROCEDURES |
|---|---|
| Check that uncertainties in emissions and removals are estimated or calculated correctly and document the categories checked and the findings. | · Check that qualifications of experts providing uncertainty estimates are appropriate.<br>· Check that qualifications, assumptions and expert judgments are recorded. Check that calculated uncertainties are complete and calculated correctly.<br>· If necessary, manually duplicate error calculations or a small sample of the probability distributions used by Monte Carlo analyses, including the modes of all parameters. |
| Undertake review of internal documentation and document the categories checked and the findings. | · Check that there is detailed internal documentation to support the estimates and enable duplication of the emission and uncertainty estimates.<br>· Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review. |
| Check methodological and data changes resulting in recalculations and document the categories checked and the findings. | · Check for temporal consistency in time-series input data for each source category.<br>· Check for consistency in the algorithm/method used for calculations throughout the time-series. |
| Undertake completeness checks and document the findings. | · Confirm that estimates are reported for all source categories and for all years from the appropriate base year to the period of the current inventory.<br>· Check that known data gaps that result in incomplete source category emission estimates are documented. |

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